

the whole of the scientific world, with few exceptions, followed their example, and before his death Darwin had the satisfaction of knowing that the doctrine of evolution had become almost a commonplace in the minds of the reflecting and cultivated portion of the community.

Lamarck was unquestionably a capable, industrious and enthusiastic naturalist. He possesses the merit of having grasped the truth of organic evolution, though his views as to its methods were crude and his arguments in its favour unsubstantial. He also carried out the principle on a far larger scale and with greater amplification of detail than did any of his transformist predecessors, and to him we owe the first attempt at the construction of a scheme of phylogeny. But while we readily allow all this, it seems to us, for the reasons above given, that in the present work the importance of Lamarck and of his contribution to the progress of evolutionary theory is greatly over-estimated. Nevertheless, in putting before us within reasonable compass a careful and critical account of the little that is known of the life and circumstances of Lamarck, and of his relations with the leaders of scientific thought in France during a period which is full of interest, Dr. Packard has done real service. He seems inclined to complain that writers on evolution "do not know their Lamarck." Whether this be true or not, the extracts from Lamarck's writings here given are so representative and so copious that there will in future be no excuse for ignorance as to what Lamarck's tenets really were. It may be doubted whether the well-known chapters in Lyell's "Principles" do not really contain all that is requisite for forming a working estimate of the Lamarckian doctrine. But there are some to whom, for various reasons, a more extended acquaintance with this doctrine will be necessary, and who yet possess neither the time nor the opportunity for attacking the works of Lamarck in their original form. To such readers, if they are willing to show indulgence towards a certain amount of needless repetition and some occasional inaccuracy in translation and other matters, Dr. Packard's interesting and thorough-going volume may be recommended with confidence. F. A. D.

#### ELEMENTARY CHEMISTRY.

*Elementary Inorganic Chemistry.* By James Walker, D.Sc., Ph.D., F.R.S. Pp. 265. (London : George Bell and Sons, 1901.) Price 3s. 6d.

*Experimental Chemistry.* By Lyman C. Newell, Ph.D., State Normal School, Lowell, Mass. Pp. xv + 410. (London : D. C. Heath and Co., 1902.) Price 5s.

*Elementary Experimental Chemistry.* By W. F. Watson, A.M., Furman University, South Carolina. Pp. 320. (New York : A. S. Barnes and Co., 1901.) Price 7s. net.

THE first of these books may be said to meet a distinct want, felt in this case by others than the author, and to meet it extremely well. It is an elementary treatise on chemistry imbued with the spirit of the times, but written with restraint and marked by the lucid and philosophic style characteristic of the best class of scientific writing. It is not an ancient garment embroidered with new ions, nor is it an aggravated bouleversement of the chemistry that was presented to

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us twenty years ago. It would probably do most chemists good to read it, and it is admirably adapted as a first college book for students. It contains the essentials of chemical theory and a really judicious selection of chemical facts, and it is to be commended, perhaps, most of all to examiners, whose sins in asking for unimportant facts abate but slowly. It is no book for those who have to charge their memories with Dutch liquid, puce-coloured oxide of lead and powder of Algaroth ; yet it does not relegate the conception of mass action and reversible changes to a period of grave and senior study. It is, in fact, a book which can be unreservedly recommended, and Prof. Walker deserves our thanks for having written it.

Dr. Newell's book is a thoughtful and interesting attempt to improve upon the older kind of text-book, and the author endeavours to interweave a laboratory course with adequate descriptive matter. It is difficult to judge such a book fairly without putting it to practical use, but there seems every prospect that by using it as the author intends it to be used the student would be brought to the right view of chemical science and to a sound knowledge of the leading principles and facts. The book abounds in practical and theoretical problems, and encouragement is given to the discussion of laboratory results in class—a most valuable form of teaching. There is a tendency in books of this kind for some of the statements, questions and injunctions to become a little puerile, and to conjure up a picture of ingenuousness which, in the present writer's experience, is not often found in real life, at least among male students. However, there is not very much to complain of in this way. The book has obvious merits, and the author may fairly claim that it deserves a trial.

The third work under review is intended especially for students who only take one short course of chemistry. A reviewer will, according to his disposition, be either intimidated or exasperated by the author's statement that he is "profoundly grateful to ten different educators for reading the proof sheets and making valuable suggestions." To make any objections after this announcement seems perhaps rash ; but at whatever cost, the author and the ten educators must be faced with the statement that to an eleventh educator the book has proved disappointing. The introduction to the work comprises ten pages, and it consists of a series of statements defining matter, chemical compounds and mechanical mixtures, atoms, molecules, indestructibility of matter and conservation of energy. It is difficult to know what purpose is served by confronting the student at the very outset of chemical study with a series of dogmas such as are found here. The idea of the atom, for instance, is introduced by the statement that "a single symbol as C and Cl indicates one atom of the element." Immediately upon this comes "An atom is the smallest portion of matter that can take part in a chemical change. It is indivisible."

The atom being thus disposed of, the molecule is dealt with in like fashion. It is really astonishing to find this kind of thing in a book with such pretensions as are set forth in the preface. The rest of the book is of the same mould ; there is nothing to distinguish it from dozens of other elementary chemical books of the kind that in this country have had their day and are happily

ceasing to be. A careful perusal has disclosed nothing that can give a well-intentioned critic occasion to say "this is a happy idea—that is capitally put—this is something to help us." On the contrary, if this book were to be reviewed in detail, it would be necessary to write columns of complaint. One feature of novelty appears in the book in the form of full-page illustrations of apparatus and materials used in all the experiments. These pictures are reproduced from photographs, and show three tiers of apparatus arranged as if for sale. In many cases it is not easy for an experienced chemist to recognise the individual pieces, and in plate xx. we reach a climax. It represents on the top shelf two tin canisters, a stoppered bottle, a Bunsen burner, a beaker, a tin dish, a blowpipe and another stoppered bottle. On the next shelf are three stoppered bottles, a hammer, four tin canisters, a small structure like a dog kennel, and a rack of twelve test-tubes. On the bottom shelf are two developing trays, a beaker, a stoppered bottle, a sugar basin, a stone gingerbeer bottle, a pocket handkerchief and apparently a bank-note or a shirt cuff. The plate bears the legend "The Metals." By the use of a lens one word of two of the labels can be deciphered.

A. S.

*SOLID GEOMETRY.*

*The Elements of Euclid, Book XI.* By R. Lachlan, Sc.D. Pp. 51. (London: Edward Arnold, n.d.) Price 1s.

IT is to be hoped that some of the scientific committees which are now dealing with the improvement of mathematical teaching, and more especially with that of the teaching of elementary geometry, will, in the process of pruning Euclid, direct attention to this little-read Book xi. As in other books of the Elements, many of the propositions are of the trivial, or even ludicrous, character, while some of the definitions lack precision. For example, can prop. 1—"one part of a straight line cannot lie in a plane and another part without the plane"—be seriously regarded as necessary? Indeed, the proof assumes the thing which it seeks to prove: let A B C be the given straight line; let a part of it, A B, lie in the plane, and a part, B C (if possible), out of the plane; produce A B in the plane to any point, D, &c. To this several other instances might be added.

Then as regards definition, the descriptions of dihedral, trihedral and (generally) polyhedral angles leave something to be desired. Possibly some better term than *angle* can be found in such cases. We are told that "when two planes meet and are terminated at their line of intersection, they are said to form a dihedral angle"; "when several planes meet in a point, they are said to form a polyhedral angle." All that such planes visibly "form" is a certain figure; the "angle" which they form (as it is employed in subsequent mathematics) is, in reality, an area on a sphere of unit radius. It is true that Book xi. is not concerned with this precise quantitative definition of (so-called) solid angles—better called *conical angles*—but merely with certain plane, or face, angles connected with them; nevertheless, it may be desirable to give the student, who when he reaches Book xi. can scarcely be called a *beginner*, this quantitative notion.

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In the small compass of this book there is little opportunity for anything strikingly original or novel. Dr. Lachlan finishes it with an appendix which contains a large number of propositions, examples, &c., and this appendix will be found much more valuable than Book xi. itself.

A few criticisms of a minor character may not be out of place. We notice that in the enunciation of each proposition, Dr. Lachlan always uses the simple word "is" or "are" when the proposition states a fact which can be proved; thus, "if two planes intersect, their line of intersection is a straight line." The typical editor of a modern Euclid would say "their line of intersection shall be a straight line," employing a ridiculous compulsory form of expression. There is now the beginning of a revulsion against this style, which has been considered for some curious reason to be appropriate and essential to Euclid, but to no other subject of study or conversation. So far, Dr. Lachlan is in agreement with common sense; but why does he, when setting out on the proof of the proposition, re-state the fact with a "shall be"? Twice he forgot his rule—in prop. 1, where "must be" is employed, and prop. 14, where the simple and sensible "are" of the formal enunciation remains "are" in the re-statement.

The proof of prop. 20 would avoid a tendency to mislead the student if it stated that the point C is first taken (arbitrarily), then E, and finally B and D by drawing any line, E B D, through E.

In the third line of the proof of prop. 21, the proof is rendered very much more clear by the insertion of the word "all" before the words "the  $\angle$ s," the statement then being the very obvious one that if there are two sets of fifty plane triangles, the sum of all the angles in the first set is equal to the sum of all those in the second set.

Finally, the employment of the word "power" in the definition (p. 536) "the square on the distance between a point and the centre of a sphere less the square on the radius of the sphere is called the power of the point with respect to the sphere" does not seem justifiable or necessary, although it has been employed by a geometer of high repute. The word *power* is already employed in science for something quite different from the square of a tangent. Indeed, a student of electricity might be tempted to think that this geometrical "power of points" is a mere pun on the well-known term used in connection with frictional machines. Everything must not be sacrificed to brevity; if new terms are wanted in science, they should be appropriate and expressive.

*BELGIAN BOTANICAL INVESTIGATIONS.*

*Recueil de l'Institut Botanique (Université de Bruxelles).* Par L. Errera. Tome v. Pp. xii + 357. (Bruxelles: Henri Lamertin, 1902.)

IN this book there are brought together recent papers by botanists of the Royal Academy of Belgium, which have already been published in different journals during the last two years. Although this is the first volume to be published, it appears as vol. v., since the first four volumes will be given up to earlier papers. Thus